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(54) Title: **A METHOD FOR MANUFACTURING AIR-FILLED PLASTIC CUSHIONING MATERIALS AND A COMPACT DEVICE FOR USE THEREOF**

(57) Abstract: A method for manufacturing a packing cushioning material, comprising: (a) preparing a roll of plastic material having a plurality of pre-prepared two-dimensional non-inflated cells by connecting two sheet layers of said plastic material by soldering or welding seams so as to form a double plastic film consisting of said cells and having a passage for inflating the cells, each of the cells having an opening into said passage and said cells being separated from each other by these seams and, optionally, by perforation; (b) inflating each of the cells with a blower through the passage while unrolling said roll and thus blowing the cells up into cushions, the air pressure in the cells being about the atmospheric pressure; (c) sealing each cell by welding immediately after inflating it; (d) cutting pieces of the inflated output cushioning material at a required length. The invention further relates to a device for use of this method.

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A METHOD FOR MANUFACTURING AIR-FILLED PLASTIC CUSHIONING MATERIALS AND A COMPACT DEVICE FOR USE THEREOF

Field of the invention

The present invention generally relates to air-filled plastic cushioning materials. More specifically, the present invention relates to a method for manufacturing air-filled plastic cushioning materials out of a double plastic film having pre-prepared two-dimensional cells separated from each other by welding seams, each of the cells having an air entrance. The invention further relates to a device for use of this method.

Background of the invention

While making packages for transportation of fragile products, such as glass products or electronic devices, a space filled with a shock-absorbing material has to be provided between the outer walls of the package and the packed article to secure the article from being damaged. The outer package is usually made of cardboard. Peanuts, ground paper, sponge, bubble sheets and the like are commonly used as shock-absorbing materials.

The above-mentioned packing materials are light, but due to their significant volume, they require a big storage space, as well as a big transportation room. Moreover, with the use of such packing materials, the need for dumping grounds increases on the side of the recipient of packed products. The increasing growth rate of dumping grounds is considered a serious problem in many countries.

To partly avoid these disadvantages, other shock-absorbing materials were developed, namely, air-filled plastic cushioning materials. Upon receiving an article packed with such materials, the recipient can perforate the cushioning material in order to bring it to its "zero-volume" (and, if needed, to prepare it to a complete recycling).

Most existing technologies for manufacturing such materials are based on deep drawing under vacuum or on mechanical deep drawing. The plastic cushioning materials consist of a plurality of cushions formed out of two plastic films. The cushions are filled with air and separated from each other by welding seams. Devices for manufacturing such materials include (among other units) a welding unit for making these seams. For example, DE patent No 4114506 discloses a method and a device for manufacturing an air-filled cushioning material out of two plastic films by mechanical deep drawing. The device according to this invention includes drawing rolls, a blower and a welding unit for making welding seams connecting the films and separating the cushions from each other.

In recent years, new technologies for manufacturing plastic cushioning materials have been developed, not using deep drawing. The use of these technologies eliminates not only the aforesaid problems connected with the disposal of packing materials, but also problems of their storage and transportation. Shinwa Ltd. (Japan) uses one of these methods in the manufacture of plastic cushioning materials filled with pressurized air. The Shinwa cushioning materials are manufactured out of a double plastic film consisting of a plurality of pre-prepared two-dimensional cells separated from each other by welding seams. The cells are blown up with pressurized air in a specific device. Each of the cells has a one-way

valve hermetically closing the cell when the pressure in the cell reaches a certain value significantly exceeding the atmospheric pressure.

According to the method of the present invention, the cushioning materials are also produced out of a double plastic film comprised of pre-made two-dimensional cells. However, unlike the Shinwa plastic cushioning materials, the cushioning materials produced according to the technology offered by the present invention are filled with air under close-to-atmospheric pressure. In the absence of the high pressure, there is no need to include in the cells the one-way valves. Nor is it necessary to use for manufacturing these materials expensive plastics resistant to high pressure. This makes cushioning materials made according to the present invention much cheaper than those manufactured by Shinwa Ltd.

The device according to the present invention includes neither a deep-drawing unit, nor a compressor, nor a unit for making welding seams between the cushions. It also does not need a connection to a source of pressurized air. For these reasons, the device according to the present invention is much simpler and cheaper than the devices of prior art.

Due to the absence of the aforesaid units, the device of the present invention is of the size of a table printer. (Compare with devices developed in recent years, having, e.g., the size of a domestic washing machine). Such a device can be installed at any place at the user's convenience.

The device of the present invention can be used in big factories manufacturing packed products, as well as in supermarkets, computer shops, offices and other places where packaging, though extremely needed, is not done on an industrial scale. Such consumers are not interested in relatively big and expensive machines containing compressors, for manufacturing packing materials.

Summary of the invention

The present invention relates to a method for manufacturing air-filled plastic cushioning materials out of a double plastic film having pre-prepared two-dimensional cells separated from each other by welding seams, each of the cells having an air entrance. The invention further relates to a device for use of this method.

The method according to the present invention comprises:

- a) Preparing a roll of a plastic material having a plurality of pre-prepared two-dimensional non-inflated cells. The roll is prepared by connecting two sheet layers of said plastic material by soldering or welding seams so as to form a double plastic film consisting of said cells and having a passage for inflating the cells. Each of the cells has an opening into said passage. The cells are separated from each other by these seams and, optionally, by perforation.
- b) Inflating each of the cells with a blower through the passage while unrolling said roll and thus blowing the cells into cushions. Due to the use of a blower, the air pressure in each cell is close to the atmospheric pressure
- c) Sealing each cell by welding immediately after inflating it.
- d) Cutting sheets of the inflated output cushioning material at a required length.

In a preferred embodiment of the present invention, the soldering or welding seams are straight lines perpendicular to the longitudinal edge of the double plastic film. Said passage is made parallel to the longitudinal edge of the double film in the middle of the film or adjacent to this longitudinal edge.

The present invention also provides for preferred embodiments in which the seams are curved so as to produce cushions in a variety of shapes, including cushions shaped like a banana, a wave, etc.

From the considerations of convenience, the roll can be loaded on a disposable cassette.

The length and/or the volume of the cushions and/or the number of cushions in a cut-off sheet of the cushioning material are programmable.

The device for manufacturing packing cushioning materials according to the aforesaid method of the present invention comprises:

- a) A reel loaded with a roll of the aforesaid double plastic film.
- b) A case being located adjacent to said reel and having an input for the unrolled film and an output for the blown up cushions.
- c) A blower for blowing up each of said cells into a cushion, the outlet connection of said blower being unmovably placed in said passage.
- d) A means for sealing said opening of each cell immediately after the cell is blown up.
- e) A mechanism providing a regular feeding of the double plastic film from said reel into the device and a corresponding output of the ready blown up cushioning material.

- f) A means for receiving the output cushioning material and cutting off pieces of said cushioning material at a predetermined length.
- g) A controller for controlling the operations of the device.

The controller is operatively connected to the drives of the aforesaid mechanism, sealing means and cutting means.

The controller, the mechanism, the sealing means, the cutting means and the blower are placed in said case.

According to the present invention, the reel can be located in a disposable cassette.

Detailed description of the present invention

The present invention will be described in detail by Fig.1 and Fig.2. This detailed description is not intended to limit the scope of the invention, but only to illustrate a preferred embodiment.

Fig.1 illustrates the method of making a cushioning material of a pre-prepared double plastic film.

Fig.2 illustrates a perspective view of a device according to the method of the present invention.

Fig.1 illustrates the method of making a cushioning material of a pre-prepared double plastic film (1). Double plastic film (1) has a plurality of pre-made rectangular two-dimensional cells (2) separated from each other by welding seams (7). All the cells are connected by passage (5) having opening (4) into each cell. Blower (9) blows up each of cells (2) in successive order through inflator (8) while roll (3) is unrolled by means of a device according to the method. Air jets within a

cell being blown are denoted (10). Roll (3) is placed in disposable cassette (6). In Fig.1, the cell being blown is denoted (2a), the blown-up cells (cushions) are denoted (2b), the cells before the inflation are denoted (2). After cell (2a) is blown up, a sealing unit (not shown) of the aforesaid device seals opening (4) of the cell. Thereafter, film (1) is moved by means of the device until opening (4) of the next cell (2) is connected to inflator (8). An arrow shows the direction in which film (1) is moving.

Fig.2 illustrates a perspective view of device (12), according to the method of the present invention. Pre-prepared double plastic film (1), regularly fed into the device from roll (3) passes through device (12), operated by a controller (not shown) located in case (15). While passing through the device, cells (2) (see Fig.1) of double plastic film (1) are, in successive order, blown up into cushions (2b) by blower (9) through inflator (8), placed in passage (5). Welding means (16), turning around hinge (17), seals opening (4) of each cell (2) immediately after it is blown up. Hinge (17) is fixed inside case (15) of the device. Roll (3) is placed in disposable cassette (6). A ready cushioning material comprised of cushions (2b), connected by welding seams (7) comes out of the device and can be cut or torn off at a desired length on shelf (13). Mechanism (18) provides the regular feeding of film (1) into the device and the corresponding output of ready cushioning material (2b). Device (12) is placed on table (14).

Claims

1. A method for manufacturing a packing cushioning material, comprising;

- a) preparing a roll of plastic material having a plurality of pre-prepared two-dimensional non-inflated cells by connecting two sheet layers of said plastic material by soldering or welding seams so as to form a double plastic film consisting of said cells and having a passage for inflating the cells, each of the cells having an opening into said passage, and said cells being separated from each other by these seams and, optionally, by perforation;
- b) inflating each of the cells with a blower through the passage while unrolling said roll and thus blowing the cells up into cushions, the air pressure in the cells being about the atmospheric pressure;
- c) sealing each cell by welding immediately after inflating it;
- d) cutting pieces of the inflated output cushioning material at a required length.

2. A method according to claim 1, wherein said soldering or welding seams are straight lines perpendicular to the longitudinal edge of the double plastic film, and said passage is made parallel to the longitudinal edge of the double film in the middle of the double film or adjacent to this longitudinal edge.

3. A method according to any of the preceding claims, wherein said roll is loaded on a disposable cassette.

4. A method according to any of the preceding claims, wherein the length and/or the volume of the cushions and/or the number of

cushions in a cut-off sheet of the cushioning material are programmable.

5. A device for manufacturing a packing cushioning material using the method as defined in claims 1 - 4, comprising;
 - a) a reel loaded with a roll of a double plastic film as defined in claim 1;
 - b) a case being located adjacent to said reel and having an input for the unrolled film and an output for the blown up cushions.
 - c) a blower for blowing up each of said cells into a cushion, the outlet connection of said blower being unmovably placed in said passage;
 - d) a means for sealing said opening of each cell immediately after the cell is blown up;
 - e) a mechanism providing a regular feeding of the double plastic film from said reel into the device and a corresponding output of the ready blown up cushioning material;
 - f) a means for receiving the output cushioning material and cutting off pieces of said cushioning material at a predetermined length,
 - g) a controller for controlling the operations of the device.
6. A device according to claim 5, wherein said reel is located in a disposable cassette.
7. A device according to claims 5 and 6, wherein said means for sealing blown-up cells is a welding means hinged inside said case.

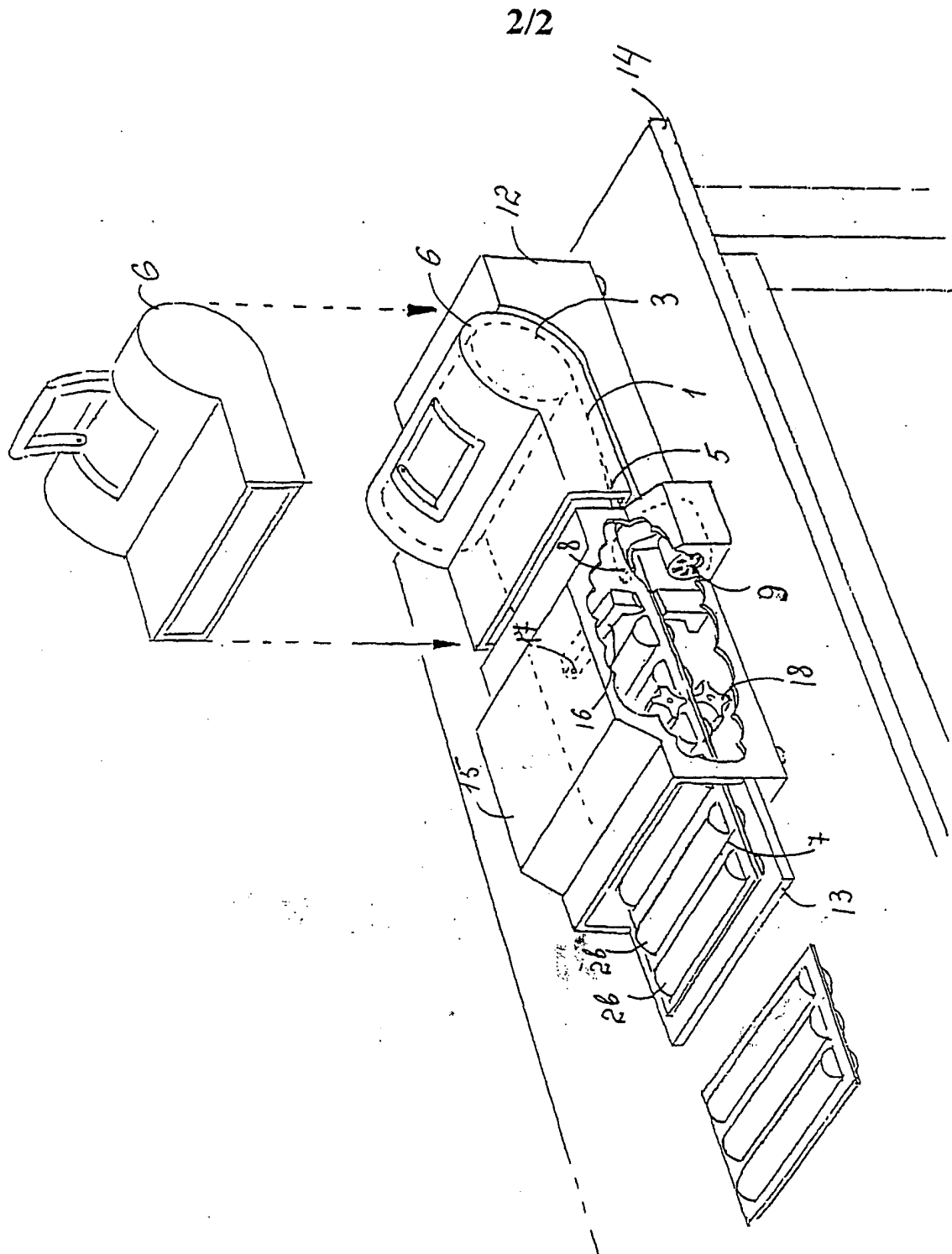


Figure 2

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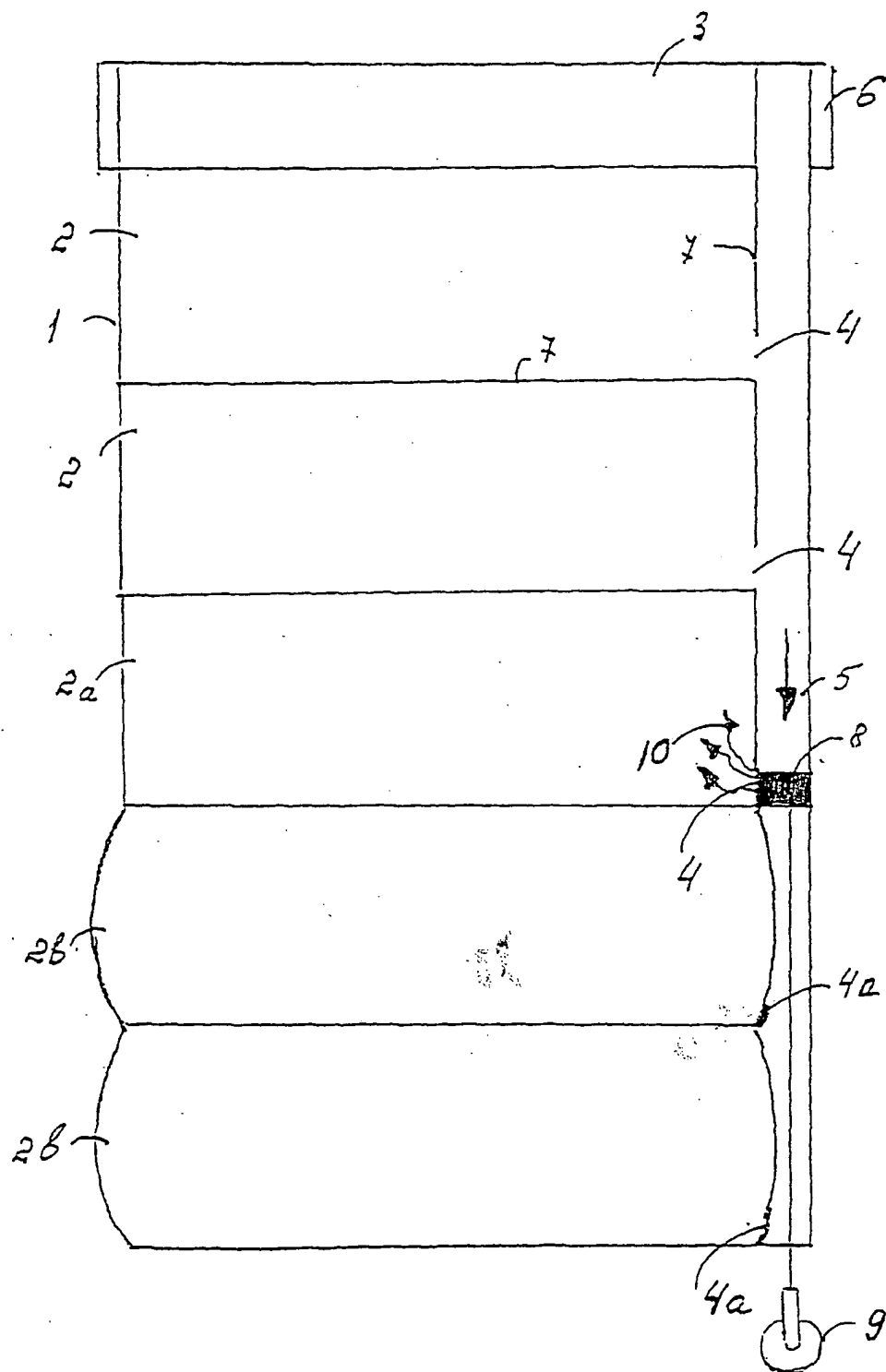


Figure 1

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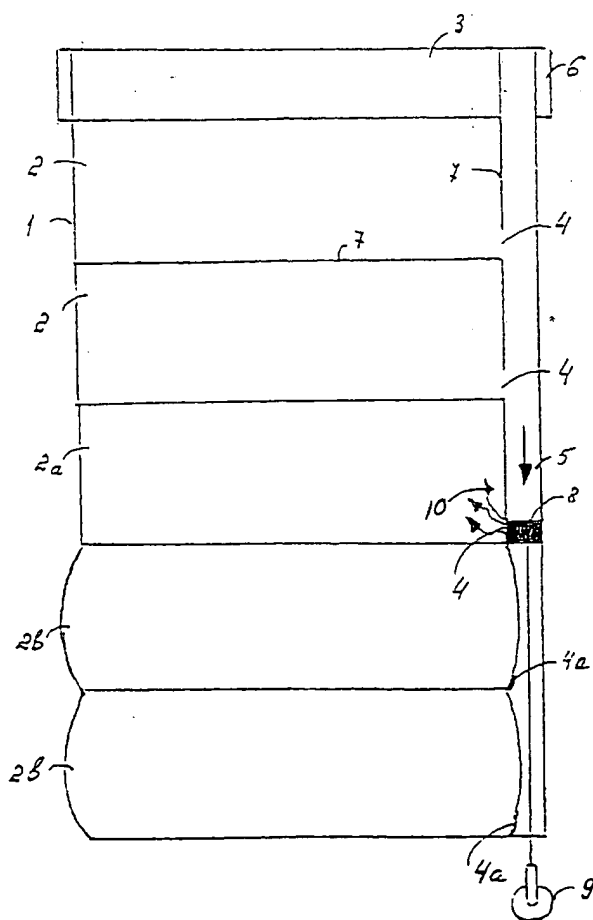
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135409 2 April 2000 (02.04.2000) IL</p> <p>(71) Applicant (for all designated States except US):
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[IL/IL]; Padova St. 6, 69978 Tel-Aviv (IL).</p> <p>(74) Agent: NOAM, Meir; P.O. Box 34335, 91342 Jerusalem (IL).</p> <p>(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.</p> <p>(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,</p> |
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(54) Title: METHOD FOR MANUFACTURING AIR-FILLED CUSHIONING MATERIALS



(57) Abstract: A method for manufacturing a packing cushioning material, comprising: (a) preparing a roll (3) of plastic material having a plurality of pre-prepared two-dimensional non-inflated cells (2) by connecting two sheet layers (1) of said plastic material by soldering or welding seams (7) so as to form a double plastic film consisting of said cells (2) and having a passage (5) for inflating the cells (2), each of the cells (2) having an opening (4) into said passage (5) and said cells (2) being separated from each other by these seams (7) and, optionally, by perforation; (b) inflating each of the cells (2) with a blower (9) through the passage (5) while unrolling said roll (3), and thus blowing the cells (2) up into cushions, the air pressure in the cells (2) being about the atmospheric pressure; (c) sealing each cell (2) by welding immediately after inflating it; (d) cutting pieces of the inflated output cushioning material at a required length. The invention further relates to a device for use of this method.

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	---	3,6
Y	US 4 096 306 A (LARSON CURTIS L) 20 June 1978 (1978-06-20) the whole document	1,2,4,5, 7
Y	US 5 261 466 A (KOYANAGI SHINGO) 16 November 1993 (1993-11-16) column 1, line 45 -column 2, line 7 figures 1-6	1,2
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International Application No

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